The Practice of Sufficient Food Safety in the USA – the World's Leader of Food Export

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Abstract. The article presents the study of the experience of sufficient food safety in the USA. It was established that the achieved success in effective food safety of the USA is the result of a complex approach to the problems of the agrarian sector during many decades. High efficiency of agricultural and food policy is provided by its consistency and continuity.

The objective of the article was to ground theory, methodology, conceptual and applied principles for the formation of a stable system of food safety on the basis of effective development of agro-industrial complex of the USA.

In the process of research we applied a complex approach which presupposes certain distribution of functions while studying one object of research, systematization of the results which allows disclosing peculiarities of sufficient food safety in the USA – the world's leader of food export. The generalization of facts and relations were carried out with the help of interpretation methods such as dialectical, structural, historical and logical.

The research helped to define that the USA is the biggest agricultural country in the world. It was possible to achieve it due to significant and forehanded support of agricultural producers, transition to a highly technological and innovative way of development. Following the export policy the country has no problems with food dependence on import. Conversely, the USA is the world biggest food exporter. Besides, there are considerable reserves of farmlands that are cultivated by small farmers to keep the land in good condition. The problem of economic accessibility of food for the population was also solved. The share of costs on food of the total amount of a family budget is smaller and smaller with every coming year.

Key words: food safety, agro-industrial policy, agricultural and food complex, world trade, accessibility of food.

Introduction. The experience of sufficient food safety of the USA attracts special attention as food safety of this country is considered to be completely achieved at present. Firstly, there is no problem in sufficient food independence. The agro-industrial complex of the USA satisfies not only domestic needs for food products but also produces a considerable amount of food to export. Secondly, the country successfully solves the problem of economic accessibility of food for the population which is the most important part in sufficient food safety and food independence.

The US population is about 290 million people. Only 2,9 million people or 1% of the total population are engaged in agriculture. The fact shows that one farmer provides food for 100 people inside the country and also produces products for overseas consumers. The US agriculture is a powerful highly productive sphere which produces only 0,8% of GDP of the country [1].

In 2010 the country held the 9^{th} place among countries with the lowest share of agricultural production in the total volume of GDP. But despite the small share of agricultural production in the GDP the USA is the biggest exporter of food in the world.

The topicality of the problem of food safety as the priority in agricultural policy of the USA can be proved by theoretical research and generalizations of national and foreign scholars such as A. Babych, A. Poberezhna, O. Ovchinnikova, A. Ohinskyy [2-4].

Despite numerous studies there is a need in a complex and systematic grounding of the main theoretical and methodological approaches to the formation of a stable system of food safety on the example of the USA.

The object of the present study is the methodology of estimation and analysis of influence of some factors on the possibilities of ensuring food security of the USA.

The objective of the article is to ground theoretical and methodological, conceptual and applied principles of the formation of a stable system of food safety on the basis of effective development of agro-industrial complex of the USA.

Scope and Methods. General methodological basis of the research is fundamental propositions of modern economic theory, works of leading scientists on the issues of food security, regulatory acts in economic, environmental and recreational activity in USA. Informational basis of the research involves the works of Ukrainian and foreign experts devoted to economic activity in the agro-industrial sector, statistical reports of State Statistics Service, various ministries and departments, author's own researches. To achieve the research aim the present study applies: the principle of scientific objectivity; methods of analysis, synthesis, with the wide use of comparative and problem analysis.

Results. At the beginning of XXI century the USA food export was on average 57 milliard dollars a year. In 2010 this figure was 64,5 milliard dollars [5]. The volumes of production and export of agricultural products of the USA are given in Table 1.

Table 1.

The share of the USA in the world production and export of agricultural products in 2000-2010, % [6]

Agricultural products	The share in the world production	The share in the world export of products	The share which is directed on export
Corn	40,8	63,1	18,3
Soy	39,4	46,1	35,3
Broilers	22,8	30,9	15,5
Beef	20,2	10,6	7,0
Wool	19,9	37,9	62,8
Wheat	9,6	25,5	49,2
Pork	9,3	13,9	9,3
Rice	1,7	12,2	49,7

Thus, the USA provides the products not only for domestic market but many of them are leading products in export.

According to the data of statistical study which was organized by The Economist, the USA held the second place in the world in production of meat, the fourth in production of fruits and wheat, the third in production of vegetables and the fifth in production of sugar [7].

As for such important constituent as economic accessibility of food for the population we have the following situation. At the beginning of 1980s of the XX century the share of family costs on food was 16%, now it is only 10% [8].

A considerable increase of food accessibility for the population was achieved due to state food programmes to help starving and poor layers of population. In order to reach the goal the country formed a subdivision called "Food and Consumer Services". Now there are more than 15 food programmes helping poor people in the USA.

These programmes are the integral element of food safety of the USA and directed to balance disproportions and social contradictions that are present in the American society [9].

It is also worth mentioning that the programmes of food help are directed to solve the problems of malnutrition among poor people as well as to increase the level of consumption of certain kinds of products which helps the state to get rid of product surplus and at the same time increases the incomes of farmers who do not low the price in case of surplus production **[**10]. The expansion of access to the food programmes from the side of the US population is one of the priority trends to support agriculture and keep up food safety of the country **[**11].

The food programmes became especially popular in the period of the world financial crisis. At the beginning of June 2009 every ninth American used food coupons and that was 33,157 million people. The poor people could use the coupons to pay for the food products at the shops **[**12]. In order to become a participant of the programme the Americans should not be at the extreme degree of poverty. The programme is available for people whose income is a bit higher than the official low-income poverty threshold.

At the beginning of June 2009 a food programme participant got coupons on the sum of 114 US dollars a month. The Congress of the USA allocated for this programme 54 milliard dollars in 2009 and in 2010 financial year the sum was 60 milliard dollars. Because of the economic crisis in the country near 6 million job places became redundant at the beginning of the year [10]. In connection with the similar negative processes in the economic and social spheres the food programme plays an extensive role to keep up the stability of the society.

The government takes measures to simplify the system of using food coupons. Recently there was a transition of the system of paper coupons to the system of plastic cards. This step made the process of getting help easier and eliminated some negative stereotypes connected with food programmes [13].

Thus, solving the problem of economic food accessibility for poor people the USA provides the sufficient level of food safety for the country in general.

Let us consider the factors which influence the successful development of the agro-industrial complex of the country and how the problem of sufficient food safety is solved.

One of the driving powers of the successful development of the American agriculture was the introduction of latest elaborations of scientific and technical progress into the production. During many years the efficiency of production grew up. From 1948 till 2004 the number of used labour force in agriculture decreased by 3,2% per year but the productivity of labour grew by 4,9% per year. All this stimulated the increase of the agricultural production by 1,7% annually [6].

According to the American scholars the main factors of the increase of productivity in the agricultural sector of the USA are the state investments into the scientific, research and design spheres, federal funding of the creation of infrastructure and successes in the development of technologies of getting means of production such as fertilizers and pesticides.

The studies of American economists proved that federal investments into agrarian science in the second part of the XX century provided up to 17% of the increase of the total productivity of resources. The coefficient of efficiency of the investments was 6:1 that is every dollar invested into science got 6 dollars of production increase.

The Ministry of agriculture of the USA allocates considerable finances to fund research at universities in the sphere of agriculture. By the beginning of the XXI century the total funding of implementation of scientific achievements rose to 1,6 milliard dollars [14].

Considering the increase of the production efficiency it is worth paying attention to the significant growth of crop capacity and productivity in stockbreeding. The key indicators of wheat production in the USA are shown in Table 2.

Table 2.

Key indicators of wheat production in the USA [6, 15]

Years	Forage and crops cultures					Food crops			Total
	Corn	Sorghum	Oat	Barley	Total	Wheat	Rice	Total*	
Harvested area, million hectares									
1966-1970	22,9	5,5	7,1	3,9	39,4	21	0,8	22,3	61,7
1996-2000	29,3	3,6	1,1	2,3	36,3	23,6	1,3	24,9	61,2
2001-2010	28,9	2,9	0,8	1,6	34,2	20	1,3	21,4	55,6
Crop capacity, centners/hectare									
1966-1970	48,9	33,5	18	22,3	38,6	18,5	51,2	19,6	31,7
1996-2000	83	42,5	20,9	32,2	73,9	27,3	65,4	29,3	55,8
2001-2010	90,5	37,4	22,1	41	82,1	27,6	75,6	30,5	62,3
Gross harvest, million tons									
1966-1970	112	18,4	12,8	8,7	151,9	38,8	4,1	43,6	195,5
1996-2000	243,3	15,3	2,3	7,4	268,3	64,4	8,5	72,9	341,2
2001-2010	261,5	10,8	1,8	6,8	280,9	55,3	9,8	65,3	357,3

* Including rye

The analysis of Table 2 shows that the growth of crop capacity of grain facilitated the increase in production. In 1960s of the XX century the total gross

harvest of grain was 195,5 million tons and in 2001-2010 it was already 357,3 million tons. The productivity of grain harvest increased nearly twice for the last 40 years from 31,7 to 62,3 centners/hectare. The growth of crop capacity was due to the selection and introduction of high-yielding sorts of seeds, effective usage of mineral fertilizers, high level of the development of agricultural machines and a complex mechanization at all stages of the production cycle.

The areas used for the production of wheat reduced by 4,8% from 1966 to 2001-2010. But due to the growth of crop capacity of the wheat (from 18,5 centners/hectare to 27,6 centers/hectare that is crop capacity grew in one and a half times) its gross harvest increased considerably during the period under consideration. The crop capacity of corn which is the basis for animal fodders increased from 49 to 90,5 centners/hectare.

The barley and oat harvesting areas from 1960s of XX century till present days decreased in 5 times as the costs for growing of the cultures in most states appeared to be much higher than growing of grain corn or sorghum. But the reduction of areas was compensated by the introduction of high yielding cultures [15].

The production of soy during the last 30 years increase in 2,7 times to 84 million tons. The harvesting areas and crop capacity grew by 50%. A special attention is paid to the production of soy as it is used in 90% for making a high protein fodder for animals.

The data presented in Table 3 show that in the period from 1950 till 2010 the number of milking cows decreased in almost 2,4 times from 21,9 to 9,2 million cows. But the production of milk during the last years increased by 62,8%. It was possible to achieve due to the increase of milk yield per one cow in 3,9 times from 9283 kilos per a cow annually.

Table 3.

The productivity of milk industry in the USA [6, 15]

Indicator	Years						
	1950	1960	1970	1980	1990	2005	2010
the number of milking cows, million cows	21,9	17,6	12	10,8	10	9	9,2
Total production of milk, million tons	52,9	55,8	53,1	58,3	67,3	80,3	86,1
Mild yield per a cow, kilos/year	2410	3176	4421	5399	6711	8880	9283

The increase of efficiency in dairy production were stimulated by a great number of milking cows at big farms, absolutely new methods of keeping animals, application of highly productive machines for dairy production, artificial insemination, application of computer machines to control the conditions of cows, special nutrition, effective breeding using modern achievements.

It is also important to notice the role of introduction of scientific achievements into the development of dairy production in recent years. During 1990-2010 the number of milking cows decreased by about 8% but those years became the period of unbelievable growth of productivity. In 1990 the milk yield per a cow was 6711 kilos/year and in 2010 – 9283 kilos/year (the increase in productivity by 38,3%). Due to this the volume of milk production for the analysed period grew by 27,9%.

In 2010 the USA produced 10,7 million tons of pork which was 1,9 times more than the average annual production of this kind of meat in 1960s of the XX century and by 24% more than it was produced in 1998. That considerable increase of production happened because of the growth of its efficiency. The success in pig farming of the USA is connected with the enlargement of production (optimization of the farms' sizes).

The USA is one the leading producers of beef in the world. In 2010 the production of beef grew to 12,2 million tons which is 5% higher than it was

produced in 1998 and by 37% higher of the average annual volumes of production in 1960s of the XX century.

The leading positions in the production of beef were reached due to the following directions in the activity:

1) separation of meat stockbreeding into a separate branch;

2) division of the brunch into three separate sectors – production of young cattle of meat breed, its further growing and intensive feeding;

3) regional specialization and concentration of the number of breeding stock and young cattle according to the growing periods;

4) effective selection and breeding work;

5) improvement of the ration and fodder basis, development of specialized fodder industry [5];

6) enlargement of production. In 1987 a typical American cattle breeding farm counted 17,5 thousand animals and by 2010 it grew to 42 thousand animals (Table 4.).

Table 4.

Typical size of farms in the USA according to the kinds of agricultural products [6]

Indicators	Years		
	1987	2002	2010
Cattle breeding (quantity per one farm)			
Broilers	300 000	520 000	575 000
Pigs	1 200	23 400	30 000
Feeding of cattle	17532	34494	42000
Milk	80	275	480
Plant growing (hectares per a farm)			
Maize	80	180	315
Soy	97	192	253
Wheat	162	314	385
Wool	180	368	390
Rice	118	243	257
Potato	140	324	350

The US share on the world's market of the production of poultry is 22,8%. About 15,5% of the poultry meat produced at the domestic market is exported which gives the USA a 30,9% share in the world export (Table 1.).

In 2010 the volume of poultry meat production was 19,6 million tons which was more than 30% higher than in 1998.

The main volumes of poultry are produced at big farms. About 3,2% of the biggest poultry farms have the annual sales volume of 1 million dollars and more which is 1/3 of the domestic production of poultry meat. The process of enlargement of poultry farms has been carried out for several decades. In 1987 a typical American poultry farm counted about 300 thousand broilers and in 2007 their number grew in more than 1,9 times to 575 thousand (Table 4.).

The federal agrarian policy of the USA tends to strengthen and develop large-scale production because larger enterprises are able to produce relatively cheap competitive products. According to the data for 2007 there were 125 thousand of big farms which is only 6% of the total number but they produce more than 75% of all agricultural products in the USA.

The average size of an American farm is about 200 hectares and the size of big plant growing farms is about several thousand hectares. The mechanization of these gigantic farms is so high that it is possible to manage the farms with the help of only 15-20 workers [8].

In 1970 big farms which had the income after selling their products about 500- 999 thousand dollars annually counted only 0,1% of the total number of farms. By 1990 the number of such farms was already 1,3%. At the same time the number of farms with the income lower than 20 thousand dollars a year decreased in percentage from 82,4% to 58,6%. The number of farms with the income from 100 thousand dollars per year and higher increased from1,7% to 15% during the period from 1970 till 1990 [15].

The federal support of small-scale commodity farms in the USA is also very important although this category of farms does not influence significantly

the development of agriculture on the whole. Subsidizing small farmers is carried out to support stability in the society and to save the traditional way of life on the rural areas. Moreover, the stimulation of small farmers facilitates the support of arable areas in good conditions.

Small farmers, despite their undersized role in the production, get 47% of the total sum of subsidies directed by the country to support agriculture. The small-scale farming with the cultivated areas is considered as a kind of reserve for increasing the production in future. The lands that are owned by farmers do not become degraded. In order to keep lands in good conditions the small farms get nearly 80% of all conservation payments allocated by the country.

In 1933 the US government adopted the "Agricultural Adjustment Act" in order to balance incomes of the workers in rural and urban areas. The basic tools to achieve the goal were the support of agricultural producers due to redistribution of incomes with the help of price regulation and direct payments to farmers. The goal was achieved by 1980s of the XX century [16].

The average income of rural workers (per capita) is considerably higher than the similar indicator in the country. For instance, in 2004 an average income per farmer was 82 thousand US dollars and in the country in general – 44 thousand dollars. And this, in its turn, increased the prestige of the agricultural labor.

But there were also considerable problems on the way to sustainable development of agriculture in the USA which could be solved only due to the systematic federal support and special attention to the issue of development of this industry from the side of the government.

At the beginning of 1960s of the XX century the USA had the crisis of overproduction in agriculture. This period was characterized by the presence of huge surplus of products conditioned by the overproduction and the appearance of poverty among people who lived in rural areas. Here we may mention the words of the Minister of agriculture of the USA O. Freeman who said: «The

rural America is in chronic and noiseless crisis. The rural society of America is in regress despite our agriculture is the world's productivity wonder» [17].

The government of the USA found the way out of the situation through stimulating export of agricultural products. Such policy was directed to protect national interests and achieve external political goals. The export of the surplus of agricultural products is a vivid example of capital penetration into the economies of the developing countries. Due to the export the USA expanded the sphere of economic influence and increased the level of political and economic dependence of countries importers. In 1970s of the XX century the President of the USA Ford stated the policy of export of agricultural products became a vitally important constituent of the American diplomacy.

Subsidizing export let America become the world's leader in the sphere of agriculture. This kind of support gave farmers possibility to continue production in bigger volumes and get additional competitive advantages due to the effect of large-scale production as well as federal subsidizing.

According to the estimates of OECD the total support estimate (TSE) in the USA in 2009 was one of the highest in the world – 124 554 million dollars (Table 5.) which is 23,3% higher than in 2007 and by 96,1% higher than the average annual level of support in 1986-1988.

Table 5.

Total Support Estimate of agriculture in OECD countries, million US dollars [18]

Country	Years				
	1986-1988	2007-2009	2007	2008	2009
Australia	1451	2019	2611	2072	1372
Canada	7652	9365	9885	8135	10075
EU-27	111417	147833	146842	157686	138971
Iceland	257	195	259	198	126
Japan	58422	51880	46006	52769	56866
South Korea	12822	22386	26910	20061	20185
Mexico	10395	7481	7640	7847	6956
New Zealand	551	277	314	291	225
Norway	3131	3908	3493	4085	4145
Switzerland	6458	6076	5098	6390	6741
Turkey	4217	23454	19125	26945	24293
USA	63505	109190	101047	101968	124554

According to the TSE the first place is held by the EU-27 countries (138971 million US dollars). Despite the increase of federal support expressed in value terms the TSE share in percentage of GDP decreased from 1,3% in 1986-1988 to 0,9% in 2009 (Table 6). The TSE indicator is defined as the sum of estimates of the support of producers and the estimates of support of the whole service plus the sum of transfers from the budget to the consumers of agricultural products.

Table 6.

Total Support Estimate of agriculture of OECD countries, in % of GDP [18]

Country	Years				
	1986-1988	2007-2009	2007	2008	2009
Australia	0,7	0,2	0,3	0,2	0,1
Canada	1,8	0,7	0,7	0,5	0,8
EU-27	2,6	0,9	0,9	0,9	0,8
Iceland	5	1,2	1,3	1,2	1,0
Japan	2,4	1,1	1Д	1,1	1,1
South Korea	8,8	2,4	2.6	5,2	2,4
Mexico	2,6	0,8	0,7	0,7	0,8
New Zealand	1,6	0,2	0,2	0,2	0,2
Norway	3,5	1,0	0,9	0,9	1,0
Switzerland	3,8	1,3	1,2	1,3	1,4
Turkey	3,7	3,6	2,9	3,7	4,0
USA	1,3	0,8	0,7	0,7	0,9

The present day agriculture of the USA is considerably strong. It became more competitive in the world due to the application of leading technologies. The country began to decrease the volumes of federal support and to demand the same policy from the country-members of WTO.

But together with the decrease of direct subsidies to the producers the country increased costs on services (the agrarian science, development of agricultural infrastructure, active support of promotion of the products on the world’s market) and purchasing power of the population.

Producer Support Estimate (PSE) in 2009 compared to 2007 decreased by 7,8% in comparison with the average annual level of PSE in 1986-1988 – decreased by 15,5% and was 30 598 million US dollars (Table 7).

Table 7.

Producer Support Estimate (PSE) in OECD countries, million US dollars [18]

Country	Years				
	1986-1988	2007-2009	2007	2008	2009
Australia	1447	1426	1802	1550	927
Canada	6158	6809	7163	5469	7794
EU-27	97318	128255	128256	135668	120840
Iceland	193	179	239	183	115
Japan	49754	41426	35995	41790	46492
South Korea	11679	19274	23199	17106	17518
Mexico	8437	6086	6119	6320	5821
New Zealand	432	67	97	69	34
Norway	2787	3483	3087	3650	3711
Switzerland	5325	5545	4627	5800	6209
Turkey	3909	22329	18511	25874	22603
USA	36219	30281	33203	27043	30598

General Services Support Estimate (GSSE) of the USA increased in 2009 compared to the average annual level of 1986-1988 in nearly 3,5 times to 59 984 million US dollars. The costs for services in the above-mentioned years were 27% of the total level of the support of agriculture and in 2009 they increased to 48% (Table 8.).

Table 8.

General Services Support Estimate (GSSE) in agriculture among OECD countries [18]

Country	Years				
	1986-2007	1988-2009	2007	2008	2009
Australia, million USD	95	794	1012	728	642
% of the total volume of federal support of agriculture	7	39	39	35	47
Canada, million USD	1464	2556	2721	2666	2282
% of the total volume of federal support of agriculture	19	27	28	33	23
EU-27, million USD	9187	17448	16138	19936	16269
% of the total volume of federal support of agriculture	8	12	11	13	12
Iceland, million USD	18	12	15	11	8

Continuation of Table 8

% of the total volume of federal support of agriculture	7	6	6	6	7
Japan, million USD	8775	10433	9992	10956	10350
% of the total volume of federal support of agriculture	15	20	22	21	18
South Korea, million USD	1069	3063	3663	2904	2622
% of the total volume of federal support of agriculture	8	14	14	14	13
Mexico, million USD	1105	1105	982	934	763
% of the total volume of federal support of agriculture	11	11	13	12	11
New Zealand, million USD	119	210	217	222	191
% of the total volume of federal support of agriculture	21	76	69	76	85
Norway, million USD	124	347	329	354	360
% of the total volume of federal support of agriculture	4	9	9	9	9
Switzerland, million USD	438	478	397	522	514
% of the total volume of federal support of agriculture	7	8	8	8	8
Turkey, million USD	309	1125	614	1071	1690
% of the total volume of federal support of agriculture	8	5	3	4	7
USA, million USD	17197	49229	41659	56045	59984
% of the total volume of federal support of agriculture	27	45	41	45	48

Consumer Support Estimate (CSE) in 2009 was 28 631 million US dollars. That was 5,5% higher than in 2008 and nearly 2,4 higher than in 2007. This was conditioned by a considerable increase of the federal costs on food programmes.

Discussion and Conclusions. Thus, the USA is the biggest agricultural country in the world. It was possible to achieve it due to significant and forehanded support of agricultural producers, transformation onto highly technological and innovative way of development. Following the export direction in the agrarian policy the country has no problem of food dependence on import. On the opposite, the USA is a leading world's exporter of the food products. The country has considerable reserves of arable land which is cultivated by small farms to keep the land in good condition. The problem of economic food accessibility for the population was also solved. The share of costs on production of the total volume of a family budget is getting lower with every coming year. Besides, there is economic food accessibility for the poor

layers of society through introduction of food coupons and other measures of food support. The measures are substantially financed and that leads to the increase of the stability of the society. The experience of sufficient food safety of the USA is very useful for Ukraine where there are huge agricultural reserves which can provide the necessary level of food safety as well as let the country hold leading positions in the world export of food and labour distribution.

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